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(12) **United States Patent**
Yamagishi

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(54) **TERMINAL DEVICE, SERVER DEVICE, INFORMATION PROCESSING METHOD, PROGRAM, AND LINKED APPLICATION SUPPLYING SYSTEM**

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(73) Assignee: **Sony Corporation** (JP)

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PCT Pub. Date: **May 23, 2013**

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H04N 21/4722 (2011.01)
(Continued)

(52) **U.S. Cl.**
CPC ***H04N 21/4722*** (2013.01); ***H04N 21/235*** (2013.01); ***H04N 21/278*** (2013.01);
(Continued)

(58) **Field of Classification Search**
CPC H04N 21/4722; H04N 21/235; H04N 21/278; H04N 21/44008; H04N 21/443; H04N 21/478; H04N 21/6175; H04N 21/6581; H04N 21/8405
See application file for complete search history.

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Assistant Examiner — Alfonso Castro
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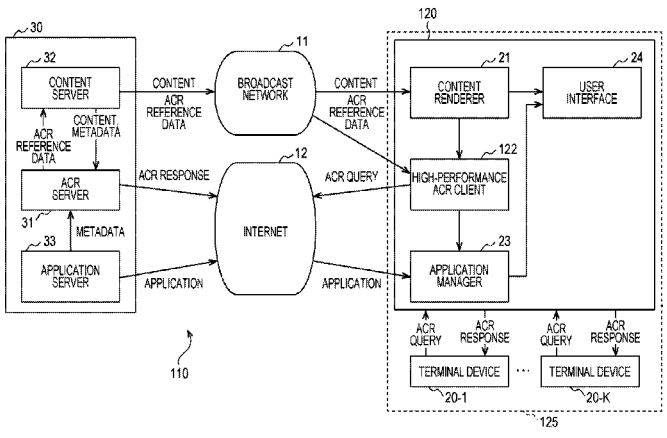
(57) **ABSTRACT**

The present disclosure relates to a terminal device, a server device, an information processing method, a program, and a linked application supplying system, which are capable of executing an application in conjunction with progress of content being viewed at a user's home.
The terminal device of the present disclosure is characterized in including a database cache unit that acquires and holds reference data which is held in a database of the server device, and a response generation unit that identifies content of an extraction source of signature data included in a second query in response to the second query transmitted from a separate terminal device belonging to a common network, by referring to the reference data in the database cache unit, and generates a second response to be returned to the separate terminal device, including at least the application identifier representing an application to be executed in conjunction with the identified content. The terminal device of the present disclosure can be applied to a TV receiver.

7 Claims, 11 Drawing Sheets



(51) **Int. Cl.**

H04N 21/278	(2011.01)
H04N 21/44	(2011.01)
H04N 21/443	(2011.01)
H04N 21/61	(2011.01)
H04N 21/658	(2011.01)
H04N 21/8405	(2011.01)
H04N 21/235	(2011.01)
H04N 21/478	(2011.01)

(52) **U.S. Cl.**

CPC ***H04N21/443*** (2013.01); ***H04N 21/44008*** (2013.01); ***H04N 21/478*** (2013.01); ***H04N 21/6175*** (2013.01); ***H04N 21/6581*** (2013.01); ***H04N 21/8405*** (2013.01)

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FIG. 1

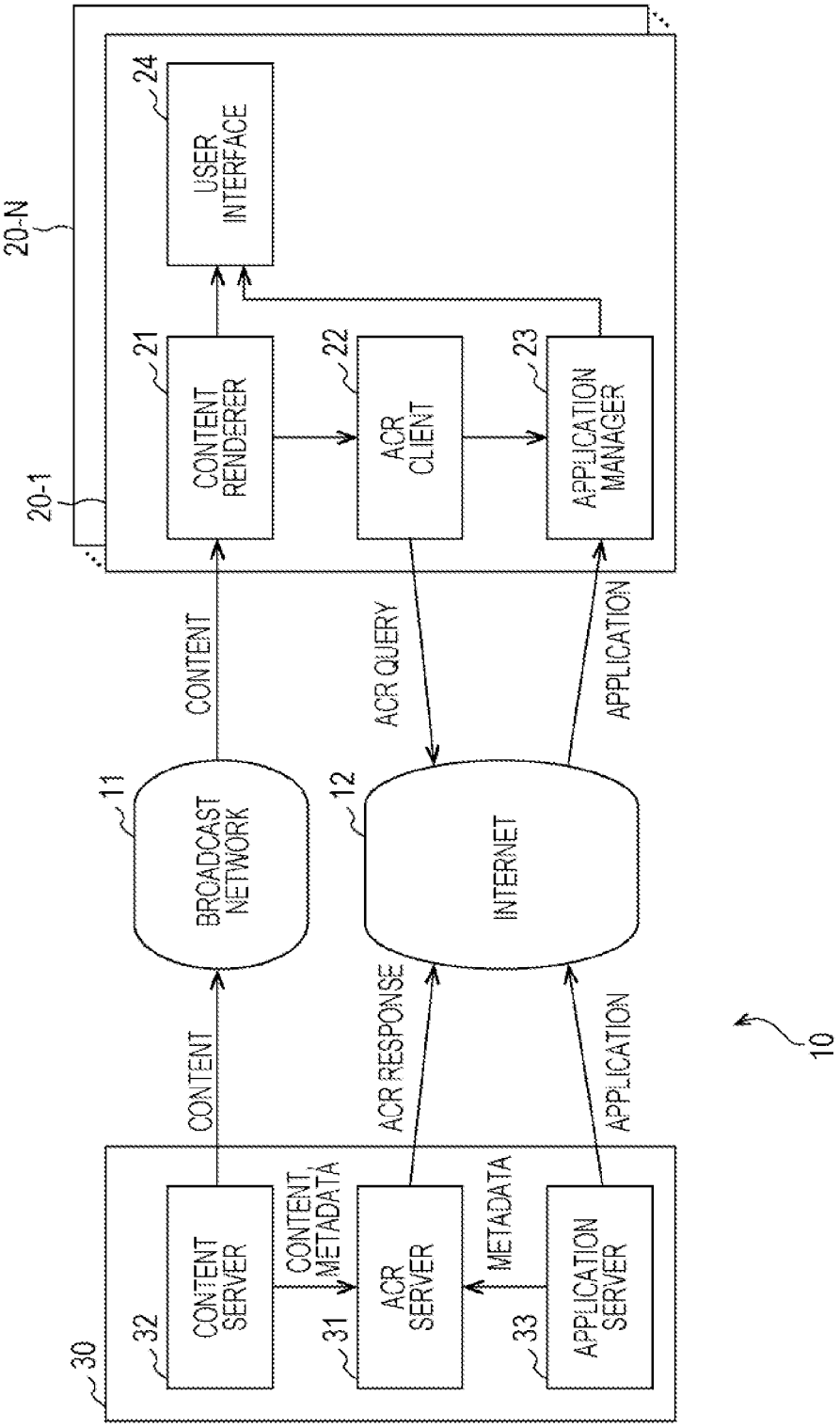

20-N
20-1
24
USER INTERFACE
21
CONTENT RENDERER
22
ACR CLIENT
23
APPLICATION MANAGER
CONTENT
ACR QUERY
APPLICATION
11
BROADCAST NETWORK
12
INTERNET
CONTENT
ACR RESPONSE
APPLICATION
10
30
32
CONTENT SERVER
CONTENT, METADATA
31
ACR SERVER
METADATA
33
APPLICATION SERVER

FIG. 2

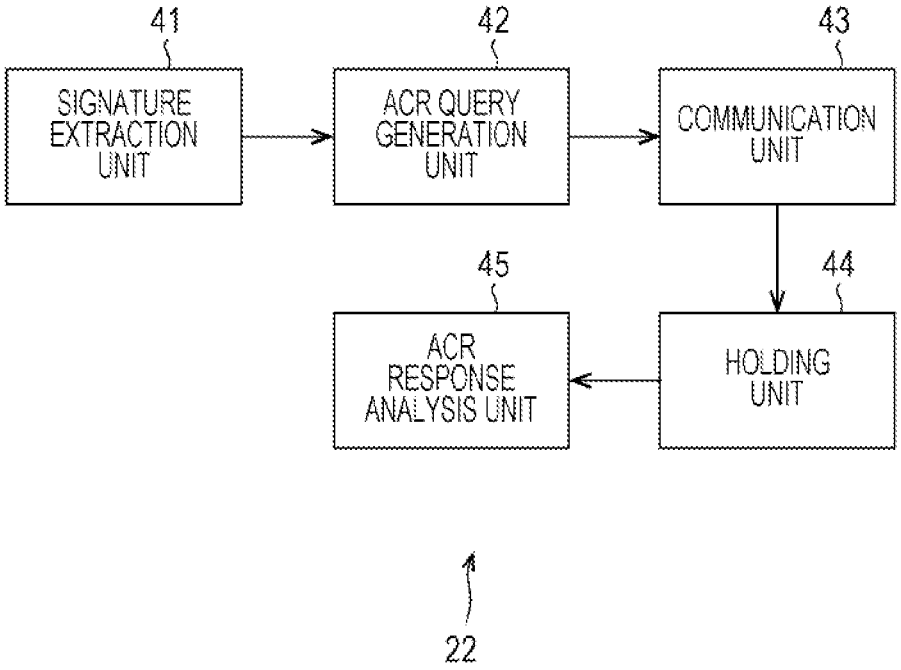

41
SIGNATURE EXTRACTION UNIT
42
ACR QUERY GENERATION UNIT
43
COMMUNICATION UNIT
44
HOLDING UNIT
45
ACR RESPONSE ANALYSIS UNIT
22

FIG. 3

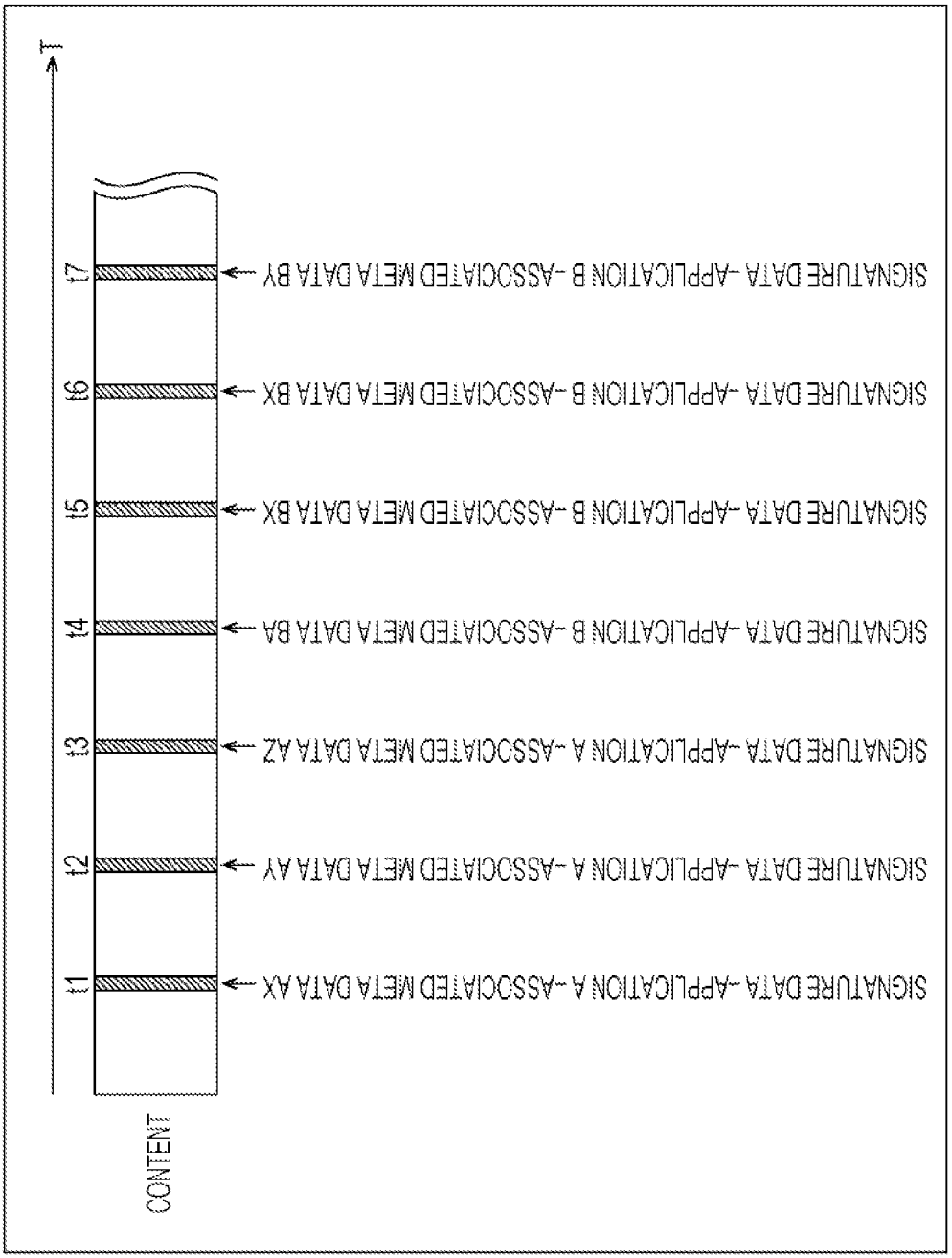

T
t1
t2
t3
t4
t5
t6
t7
SIGNATURE DATA - APPLICATION A - ASSOCIATED META DATA AX
SIGNATURE DATA - APPLICATION A - ASSOCIATED META DATA AY
SIGNATURE DATA - APPLICATION A - ASSOCIATED META DATA AZ
SIGNATURE DATA - APPLICATION B - ASSOCIATED META DATA BA
SIGNATURE DATA - APPLICATION B - ASSOCIATED META DATA BX
SIGNATURE DATA - APPLICATION B - ASSOCIATED META DATA BX
SIGNATURE DATA - APPLICATION B - ASSOCIATED META DATA BY
CONTENT

FIG. 4

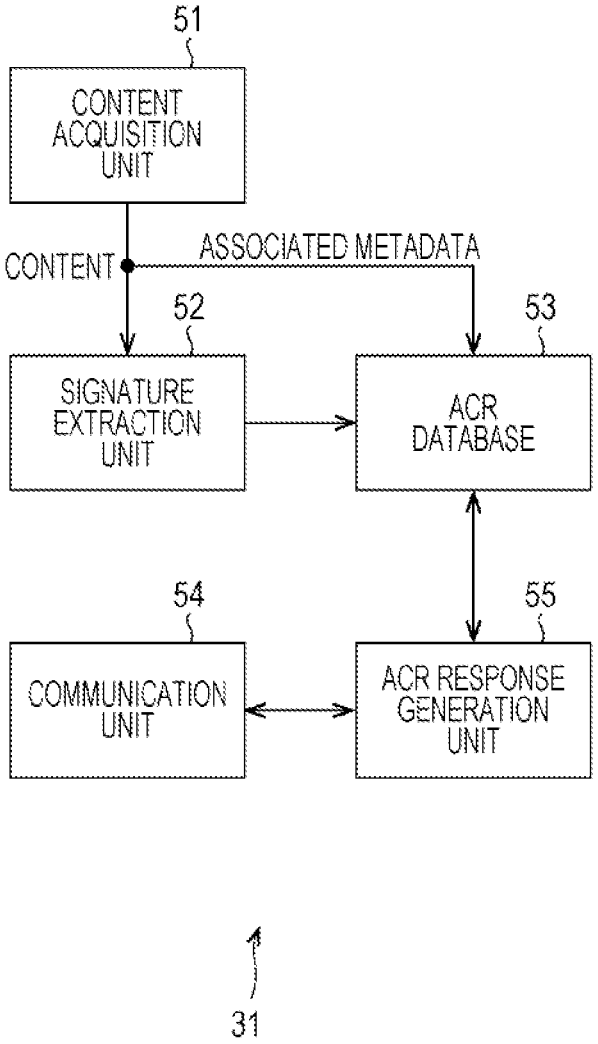

51
CONTENT ACQUISITION UNIT
CONTENT
ASSOCIATED METADATA
52
53
SIGNATURE EXTRACTION UNIT
ACR DATABASE
54
55
COMMUNICATION UNIT
ACR RESPONSE GENERATION UNIT
31

FIG. 5

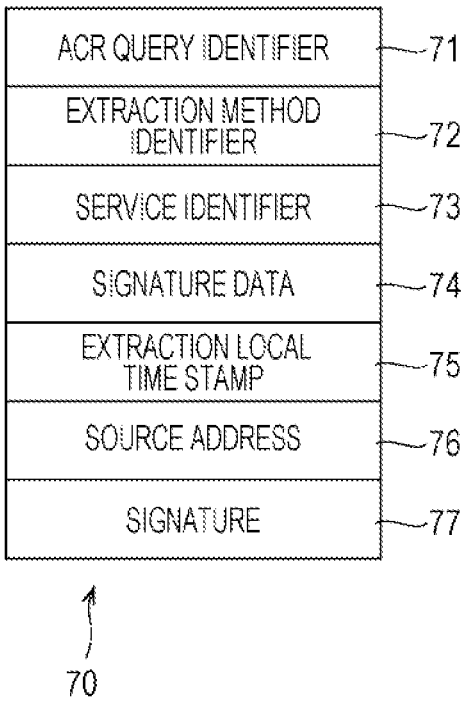

ACR QUERY IDENTIFIER
71
EXTRACTION METHOD IDENTIFIER
72
SERVICE IDENTIFIER
73
SIGNATURE DATA
74
EXTRACTION LOCAL TIME STAMP
75
SOURCE ADDRESS
76
SIGNATURE
77
70

FIG. 6

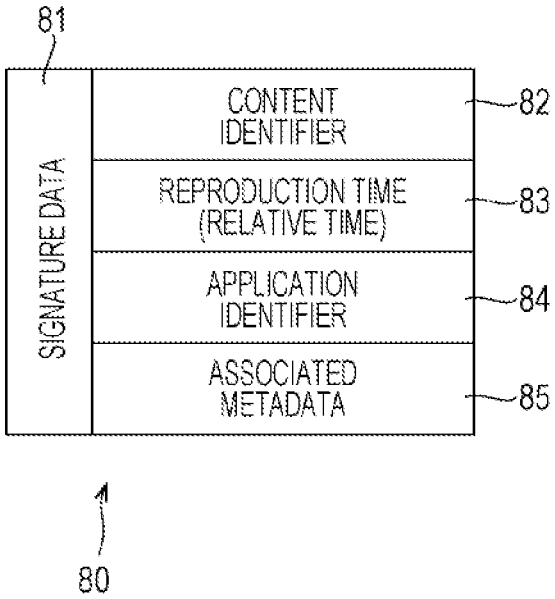

81
SIGNATURE DATA
CONTENT IDENTIFIER
82
REPRODUCTION TIME (RELATIVE TIME)
83
APPLICATION IDENTIFIER
84
ASSOCIATED METADATA
85
80

FIG. 7

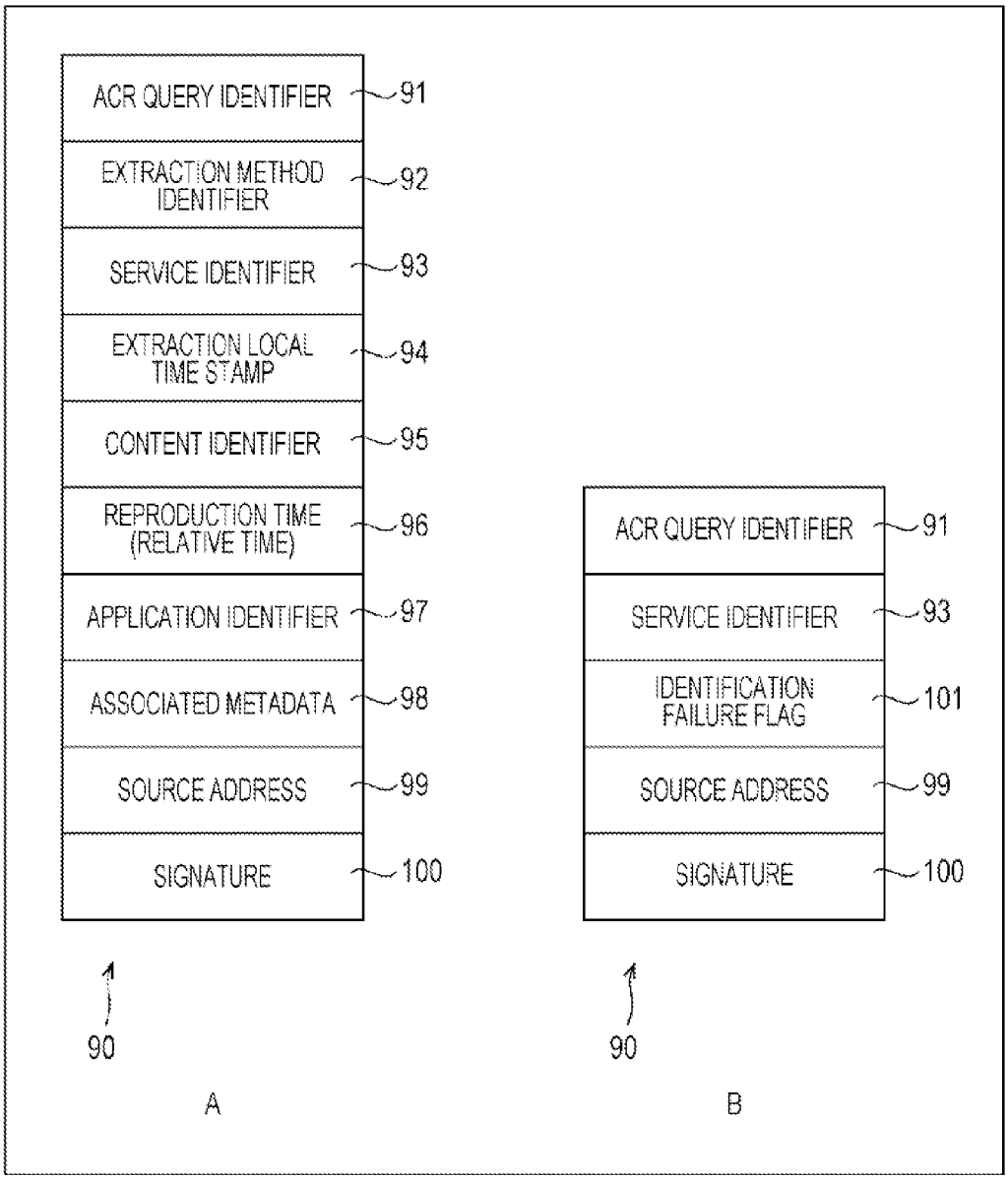

ACR QUERY IDENTIFIER
91
EXTRACTION METHOD IDENTIFIER
92
SERVICE IDENTIFIER
93
EXTRACTION LOCAL TIME STAMP
94
CONTENT IDENTIFIER
95
REPRODUCTION TIME (RELATIVE TIME)
96
APPLICATION IDENTIFIER
97
ASSOCIATED METADATA
98
SOURCE ADDRESS
99
SIGNATURE
100
90
A
ACR QUERY IDENTIFIER
91
SERVICE IDENTIFIER
93
IDENTIFICATION FAILURE FLAG
101
SOURCE ADDRESS
99
SIGNATURE
100
90
B

FIG. 8

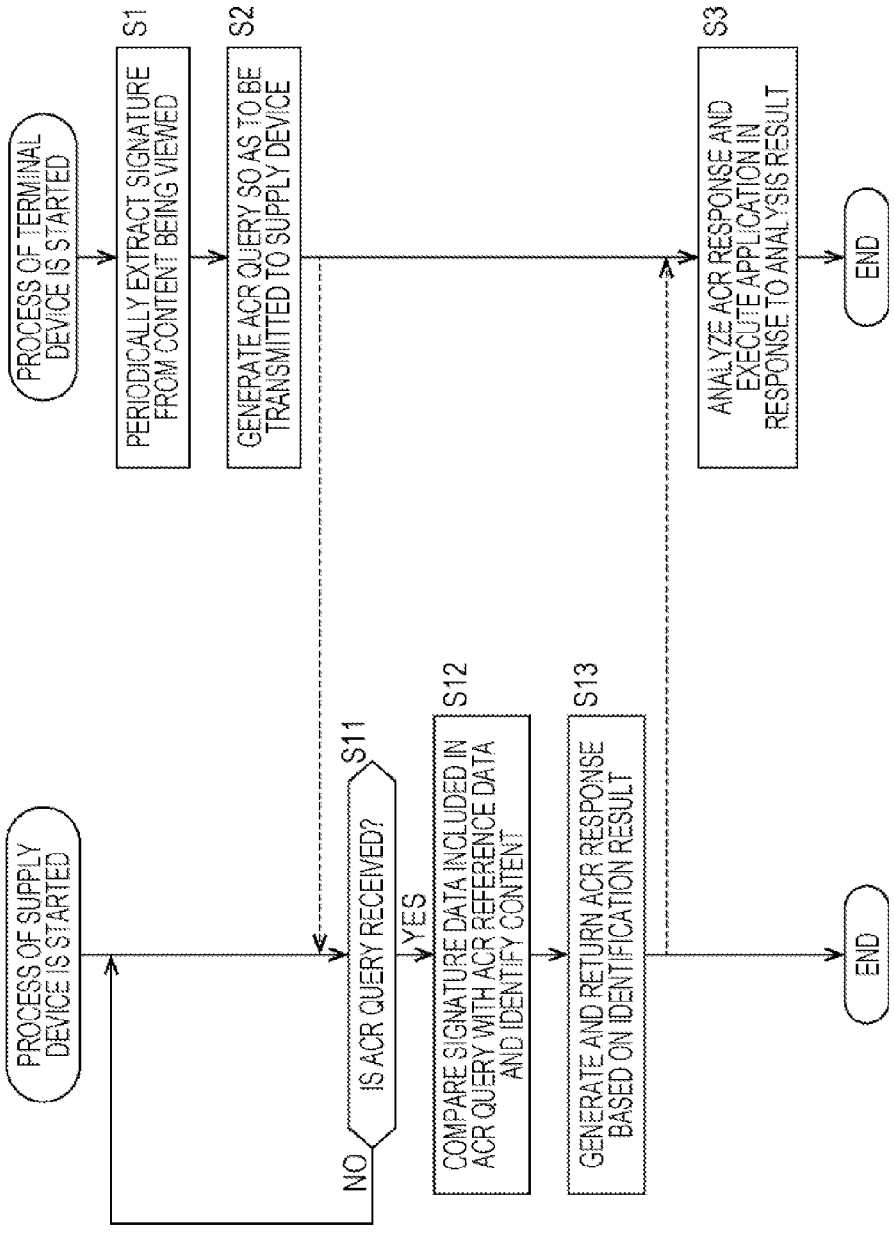

PROCESS OF TERMINAL DEVICE IS STARTED
S1
PERIODICALLY EXTRACT SIGNATURE FROM CONTENT BEING VIEWED
S2
GENERATE ACR QUERY SO AS TO BE TRANSMITTED TO SUPPLY DEVICE
S3
ANALYZE ACR RESPONSE AND EXECUTE APPLICATION IN RESPONSE TO ANALYSIS RESULT
END
PROCESS OF SUPPLY DEVICE IS STARTED
S11
IS ACR QUERY RECEIVED?
NO
YES
S12
COMPARE SIGNATURE DATA INCLUDED IN ACR QUERY WITH ACR REFERENCE DATA AND IDENTIFY CONTENT
S13
GENERATE AND RETURN ACR RESPONSE BASED ON IDENTIFICATION RESULT
END

FIG. 9

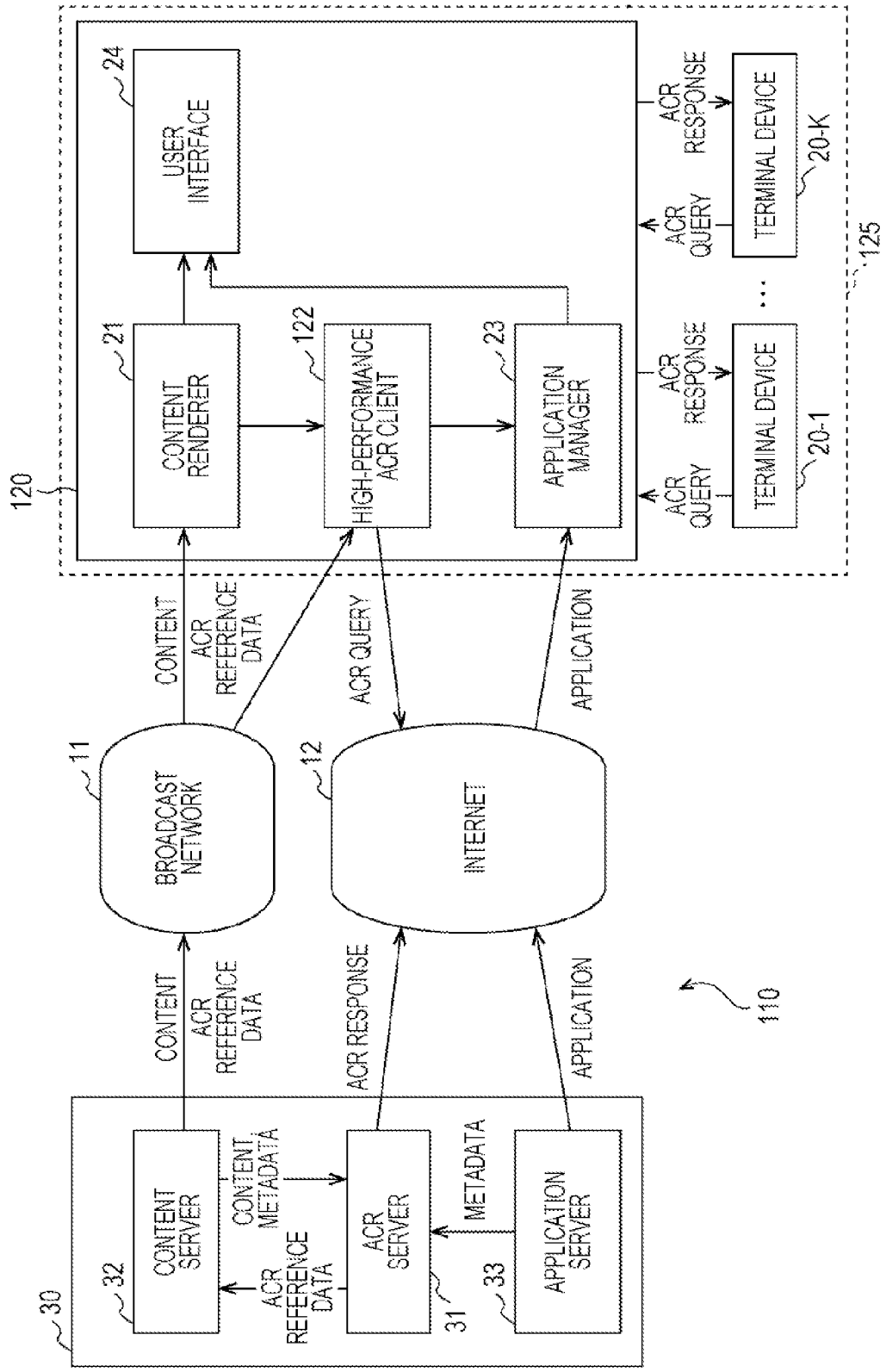

30
32
CONTENT SERVER
ACR REFERENCE DATA
CONTENT, METADATA
ACR SERVER
31
METADATA
33
APPLICATION SERVER
CONTENT
ACR REFERENCE DATA
ACR RESPONSE
APPLICATION
11
BROADCAST NETWORK
12
INTERNET
CONTENT
ACR REFERENCE DATA
ACR QUERY
APPLICATION
110
120
21
CONTENT RENDERER
122
HIGH-PERFORMANCE ACR CLIENT
23
APPLICATION MANAGER
24
USER INTERFACE
ACR QUERY
ACR RESPONSE
TERMINAL DEVICE
20-1
ACR QUERY
ACR RESPONSE
TERMINAL DEVICE
20-K
125

FIG. 10

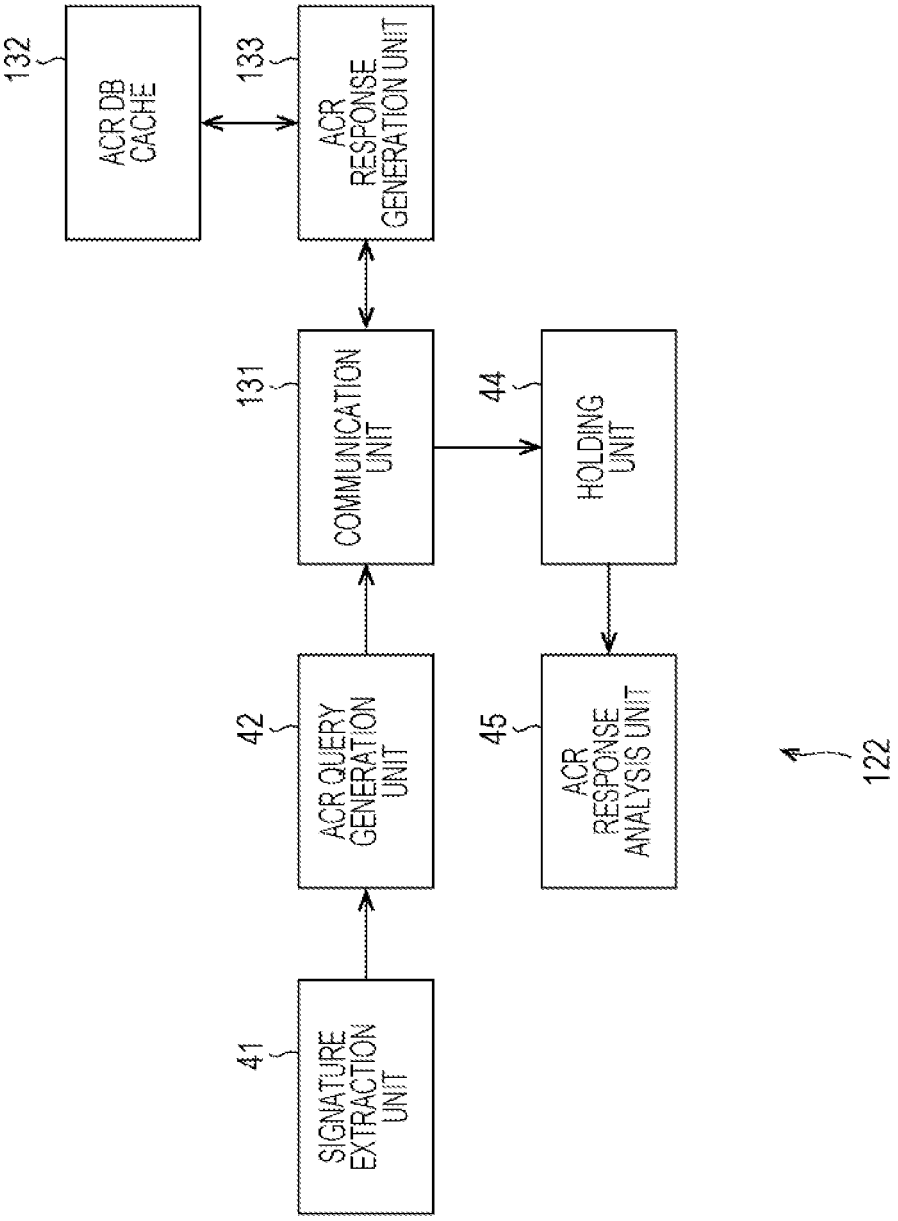

132
ACR DB CACHE
133
ACR RESPONSE GENERATION UNIT
131
COMMUNICATION UNIT
44
HOLDING UNIT
42
ACR QUERY GENERATION UNIT
45
ACR RESPONSE ANALYSIS UNIT
41
SIGNATURE EXTRACTION UNIT
122

FIG. 11

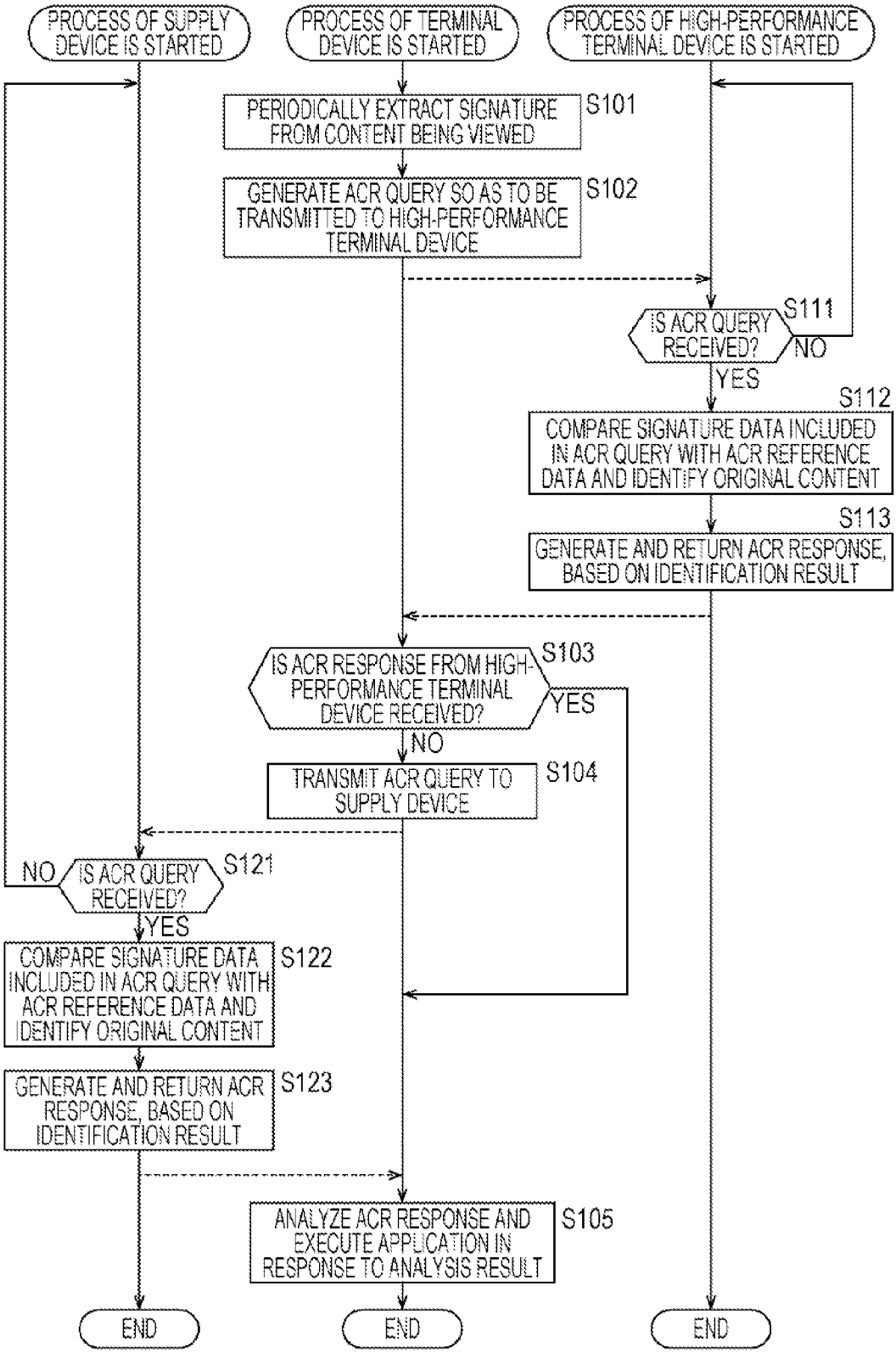
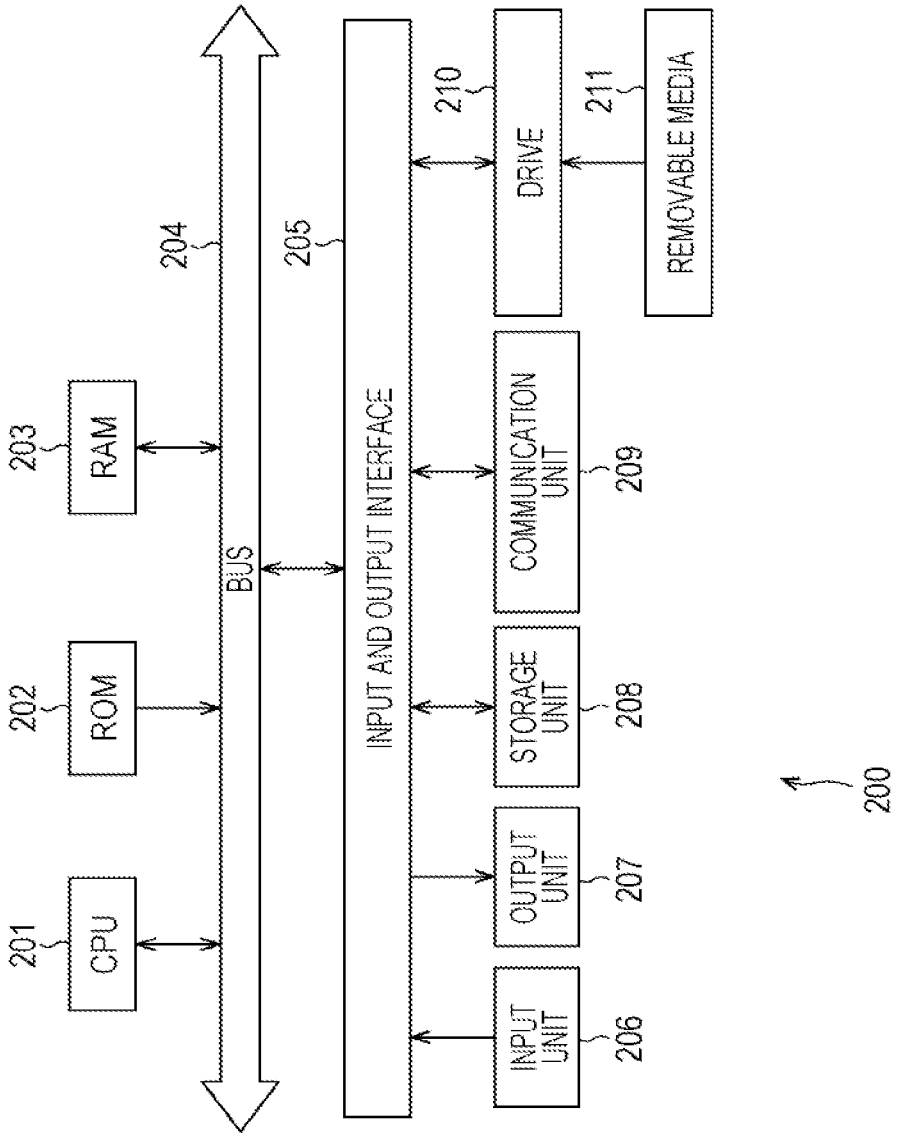

PROCESS OF SUPPLY DEVICE IS STARTED
PROCESS OF TERMINAL DEVICE IS STARTED
PROCESS OF HIGH-PERFORMANCE TERMINAL DEVICE IS STARTED
PERIODICALLY EXTRACT SIGNATURE FROM CONTENT BEING VIEWED
S101
GENERATE ACR QUERY SO AS TO BE TRANSMITTED TO HIGH-PERFORMANCE TERMINAL DEVICE
S102
IS ACR QUERY RECEIVED?
S111
NO
YES
COMPARE SIGNATURE DATA INCLUDED IN ACR QUERY WITH ACR REFERENCE DATA AND IDENTIFY ORIGINAL CONTENT
S112
GENERATE AND RETURN ACR RESPONSE, BASED ON IDENTIFICATION RESULT
S113
IS ACR RESPONSE FROM HIGH-PERFORMANCE TERMINAL DEVICE RECEIVED?
S103
YES
NO
TRANSMIT ACR QUERY TO SUPPLY DEVICE
S104
NO
IS ACR QUERY RECEIVED?
S121
YES
COMPARE SIGNATURE DATA INCLUDED IN ACR QUERY WITH ACR REFERENCE DATA AND IDENTIFY ORIGINAL CONTENT
S122
GENERATE AND RETURN ACR RESPONSE, BASED ON IDENTIFICATION RESULT
S123
ANALYZE ACR RESPONSE AND EXECUTE APPLICATION IN RESPONSE TO ANALYSIS RESULT
S105
END
END
END

FIG. 12


200
201
CPU
202
ROM
203
RAM
204
BUS
205
INPUT AND OUTPUT INTERFACE
206
INPUT UNIT
207
OUTPUT UNIT
208
STORAGE UNIT
209
COMMUNICATION UNIT
210
DRIVE
211
REMOVABLE MEDIA

TERMINAL DEVICE, SERVER DEVICE, INFORMATION PROCESSING METHOD, PROGRAM, AND LINKED APPLICATION SUPPLYING SYSTEM

CROSS-REFERENCE TO RELATED APPLICATION

The present application is a national phase entry under 35 U.S.C. §371 of International Application No. PCT/JP2012/078824 filed Nov. 7, 2012, published on May 23, 2013 as WO 2013/073430 A1, which claims priority from Japanese Patent Application No. JP 2011-248494 filed in the Japanese Patent Office on Nov. 14, 2011.

TECHNICAL FIELD

The present disclosure relates to a terminal device, a server device, an information processing method, a program, and a linked application supplying system, and more particularly to a terminal device, a server device, an information processing method, a program, and a linked application supplying system, which are intended to be capable of executing an application program in conjunction with progress of not only a television program but also any content being viewed.

BACKGROUND ART

For example, it has been considered that information relating to a TV program (hereinafter, simply referred to as a program) (a cast, a synopsis, a preview for next episode, and the like) and information not directly related to the program but useful for viewers (news, weather forecast, traffic information, and the like) are displayed on a screen for the viewers of the television (TV) program.

In order to realize this, a command for acquiring and activating a dedicated application program (hereinafter, abbreviated as an application) may be transmitted in conjunction with the progress of the program to a TV receiver or the like. In fact, this has been already realized in Japan, Europe and others, by transmitting the command and application, using a band for a data broadcast in a TV broadcast signal (for example, see PTL 1).

CITATION LIST

Patent Literature

PTL 1: Japanese Unexamined Patent Application Publication No. 2006-50237

SUMMARY OF INVENTION

Technical Problem

In contrast, in the U.S., a band for a data broadcast is not formed in a TV broadcast signal and an alternative method thereof is not established, so that executing an application in conjunction with progress of a program has not been realized.

In addition, in the U.S., most households view programs through a CATV or an IPTV rather than directly receive and view the programs by TV receivers. Since the CATV and the IPTV extract only video and audio of the programs from a TV broadcast so as to be distributed, it is not ensured that data broadcast signals including data relating to an application are transmitted to viewers even if the band for the data broadcast is formed in the TV broadcast signal in the U.S.

The present disclosure has been made in view of such a circumstance, and is intended to be capable of executing an application in conjunction with progress of content being viewed at a user's home.

Solution to Problem

A terminal device which is a first aspect of the present disclosure includes: an extraction unit that extracts, from content being reproduced, signature data representing characteristics of the content; a query generation unit that generates a first query including at least the extracted signature data; a communication unit that transmits the generated first query to a server device and receives a first response which is returned by the server device in response to the first query; an application execution unit that acquires and executes an application corresponding to an application identifier included in the received first response; a database cache unit that acquires and holds reference data in which signature data that is held in a database of the server device and represents characteristics of content extracted from the content is associated with a content identifier representing the content of an extraction source and an application identifier representing an application to be executed in conjunction with the content; and a response generation unit that identifies content of an extraction source of signature data included in a second query in response to the second query transmitted from a separate terminal device belonging to a common network, by referring to the reference data in the database cache unit, and generates a second response to be returned to the separate terminal device, including at least the application identifier representing an application to be executed in conjunction with the identified content.

The response generation unit further identifies content of an extraction source of signature data included in the first query which is generated by the query generation unit, by referring to the reference data in the database cache unit, and generates the third response including at least the application identifier representing an application to be executed in conjunction with the identified application, and the application execution unit further can acquire and execute an application corresponding to an application identifier included in the generated third response.

The query generation unit generates the first query including at least the extracted signature data and an extraction time stamp representing a timing when the signature data is extracted, and the application execution unit or an application executed by the application execution unit can acquire associated metadata which is selected by the server device based on the extraction time stamp which is included in the received second response, and perform a predetermined process.

The terminal device can be built into a reproduction device which reproduces content, and the terminal device which is the first aspect of the present disclosure can further include a content supply unit that supplies all pieces of content which are reproduced by the reproduction device, to the extraction unit.

In an information processing method which is the first aspect of the present disclosure, the information processing method of a terminal device includes, by the terminal device, an extraction step of extracting, from content to be reproduced, signature data representing characteristics of the content; a query generation step of generating a first query including at least the extracted signature data; a communi-

cation step of transmitting the generated first query to a server device and of receiving a first response which is returned by the server device in response to the first query; an application execution step of acquiring and executing an application corresponding to an application identifier included in the received first response; a database cache step of acquiring reference data in which signature data that is held in a database of the server device and represents characteristics of content extracted from the content is associated with a content identifier representing the content of an extraction source and an application identifier representing an application to be executed in conjunction with the content, and of holding the acquired reference data in a database cache unit; and a response generation step of identifying content of an extraction source of signature data included in a second query in response to the second query transmitted from a separate terminal device belonging to a common network, by referring to the reference data in the database cache unit, and of generating a second response to be returned to the separate terminal device, including at least the application identifier representing an application to be executed in conjunction with the identified content.

A program which is the first aspect of the present disclosure causing a computer to function as: an extraction unit that extracts, from content being reproduced, signature data representing characteristics of the content; a query generation unit that generates a first query including at least the extracted signature data; a communication unit that transmits the generated first query to a server device and receives a first response which is returned by the server device in response to the first query; an application execution unit that acquires and executes an application corresponding to an application identifier included in the received first response; a database cache unit that acquires and holds reference data in which signature data that is held in a database of the server device and represents characteristics of content extracted from the content is associated with a content identifier representing the content of an extraction source and an application identifier representing an application to be executed in conjunction with the content; and a response generation unit that identifies content of an extraction source of signature data included in a second query in response to the second query transmitted from a separate terminal device belonging to a common network, by referring to the reference data in the database cache unit, and generates a second response to be returned to the separate terminal device, including at least the application identifier representing an application to be executed in conjunction with the identified content.

In the first aspect of the present disclosure, reference data in which signature data representing characteristics of content extracted from the content is associated with a content identifier representing the content of an extraction source and an application identifier representing an application to be executed in conjunction with the content is acquired and held in a database cache unit, content of an extraction source of signature data included in the second query is identified in response to the second query transmitted from a separate terminal device belonging to a common network, by referring to the reference data in the database cache unit, and a second response to be returned to the separate terminal device, including at least the application identifier representing an application to be executed in conjunction with the identified content is generated.

A server device which is a second aspect of the present disclosure includes: a database that holds reference data in which signature data representing characteristics of content extracted from the content is associated with a content identifier representing the content of an extraction source and an application identifier representing an application to be executed in conjunction with the content; a response generation unit that identifies content of an extraction source of signature data included in a query transmitted from a terminal device, by referring to the reference data, and generates a response including at least the application identifier representing an application to be executed in conjunction with the identified content; a transmission unit that transmits the generated response to the terminal device; and a supply unit that supplies the reference data which is held in the database to the terminal device through a predetermined network.

The database holds reference data in which signature data representing characteristics of content extracted from the content is associated with a content identifier representing the content of an extraction source, an application identifier representing an application to be executed in conjunction with the content, and associated metadata processed in the application, and the response generation unit identifies content of an extraction source of signature data included in a query transmitted from the terminal device, by referring to the reference data, and generates the response including at least the application identifier representing an application to be executed in conjunction with the identified content and the associated metadata.

The response generation unit identifies content of an extraction source of signature data included in a query transmitted from the terminal device, by referring to the reference data, and generates the response including at least the application identifier representing an application to be executed in conjunction with the identified content and the associated metadata which is selected based on an extraction time stamp included in the query.

The response generation unit can further generate the response including a content identifier representing the identified content.

In an information processing method which is the second aspect of the present disclosure, the information processing method of a server device includes, by the server device, a reception step of receiving a query transmitted from a terminal device; a response generation step of identifying content of an extraction source of signature data included in the received query, by referring to reference data in which signature data representing characteristics of content extracted from the content is associated with a content identifier representing the content of an extraction source and an application identifier representing an application to be executed in conjunction with the content, and of generating a response including at least the application identifier representing an application to be executed in conjunction with the identified content; a transmission step of transmitting the generated response to the terminal device; and a supply step of supplying the reference data to the terminal device through a predetermined network.

A program which is the second aspect of the present disclosure causing a computer to function as: a database that holds reference data in which signature data representing characteristics of content extracted from the content is associated with a content identifier representing the content of an extraction source and an application identifier representing an application to be executed in conjunction with the content; a response generation unit that identifies content of an extraction source of signature data included in a query transmitted from a terminal device, by referring to the reference data, and generates a response including at least

the application identifier representing an application to be executed in conjunction with the identified content; and a transmission unit that transmits the generated response to the terminal device; and a supply unit that supplies the reference data which is held in the database to the terminal device through a predetermined network.

In the second aspect of the present disclosure, reference data in which signature data representing characteristics of content extracted from the content is associated with a content identifier representing the content of an extraction source and an application identifier representing an application to be executed in conjunction with the content is held in a database, and the reference data which is held in the database is supplied to the terminal device through a predetermined network.

In a linked application supplying system which is a third aspect of the present disclosure, the linked application supplying system configured with a terminal device and a server device, in which the terminal device includes: an extraction unit that extracts, from content being reproduced, signature data representing characteristics of the content; a query generation unit that generates a first query including at least the extracted signature data; a communication unit that transmits the generated first query to a server device and receives a first response which is returned by the server device in response to the first query; an application execution unit that acquires and executes an application corresponding to an application identifier included in the received first response; a database cache unit that acquires and holds reference data in which signature data that is held in a database of the server device and represents characteristics of content extracted from the content is associated with a content identifier representing the content of an extraction source and an application identifier representing an application to be executed in conjunction with the content; and a response generation unit that identifies content of an extraction source of signature data included in a second query in response to the second query transmitted from a separate terminal device belonging to a common network, by referring to the reference data in the database cache unit, and generates a second response to be returned to the separate terminal device, including at least the application identifier representing an application to be executed in conjunction with the identified content, and in which the server device includes: a database that holds the reference data; a response generation unit that identifies content of an extraction source of signature data included in the first query transmitted from the terminal device, by referring to the reference data, and generates the first response including at least the application identifier representing an application to be executed in conjunction with the identified content; a transmission unit that transmits the generated first response to the terminal device; and a supply unit that supplies the reference data which is held in the database to the terminal device through a predetermined network.

In the third aspect of the present disclosure, by the server device, reference data in which signature data representing characteristics of content extracted from the content is associated with a content identifier representing the content of an extraction source and an application identifier representing an application to be executed in conjunction with the content is held in a database, the reference data which is held in the database is supplied to the terminal device through a predetermined network. Then, by the terminal device, the reference data which is held in a database of a server device is acquired and held in the database cache unit, content of an extraction source of signature data included in the second query is identified in response to the second query transmitted from a separate terminal device belonging to a common network, by referring to the reference data in the database cache unit, and a second response to be returned to the separate terminal device, including at least the application identifier representing an application to be executed in conjunction with the identified content is generated.

Advantageous Effects of Invention

According to the first aspect of the present disclosure, it is possible to execute an application in conjunction with progress of content being viewed at a user's home.

According to the second aspect of the present disclosure, it is possible to execute an application in conjunction with progress of content being viewed at a user's home.

According to the third aspect of the present disclosure, it is possible to execute an application in conjunction with progress of content being viewed at a user's home.

BRIEF DESCRIPTION OF DRAWINGS

FIG. **1** is a block diagram of a first configuration example of a linked application supplying system which is an embodiment of the present disclosure.

FIG. **2** is a block diagram of a configuration example of an Automatic Content Recognition (ACR) client.

FIG. **3** is a diagram showing an outline of periodically extracting signature data from content.

FIG. **4** is a block diagram showing a configuration example of an ACR server.

FIG. **5** is a diagram showing a data structure of an ACR query.

FIG. **6** is a diagram showing a data structure of ACR reference data.

FIG. **7** is a diagram showing a data structure of an ACR response.

FIG. **8** is a flowchart describing an operation of the linked application supplying system shown in FIG. **1**.

FIG. **9** is a block diagram of a second configuration example of a linked application supplying system which is an embodiment of the present disclosure.

FIG. **10** is a block diagram showing a configuration example of a high-performance ACR client.

FIG. **11** is a flowchart describing an operation of the linked application supplying system shown in FIG. **10**.

FIG. **12** is a block diagram showing a configuration example of a computer.

DESCRIPTION OF EMBODIMENTS

Hereinafter, the best mode for implementing the present disclosure (hereinafter, referred to as an embodiment) will be described with reference to drawings.

[1. First Configuration Example of Linked Application Supplying System]

FIG. **1** shows a first configuration example of a linked application supplying system which is an embodiment of the present disclosure.

The linked application supplying system **10** is intended to execute an application in conjunction with progress of content being viewed by a user in a TV receiver or the like. By executing the application, it is possible to display some pieces of information (a cast, a synopsis, and a preview for next episode) relating to content being viewed and other pieces of information (news, weather forecast, traffic information, and the like) which are not directly related to the

content but useful for the user on a screen, or to realize a quiz or a vote in which the viewers can participate.

In addition, the content herein is intended to include all pieces of AV content such as a program being broadcasted over a TV broadcast network, a CATV network, an IPTV network, or the like, a program reproduced from a state in which the program has been recorded, a video reproduced from package media, and a video distributed over the Internet.

The linked application supplying system **10** includes a plurality of terminal devices **20**-**1** to **20**-N and a supply device **30**. In addition, it is assumed that each of the terminal devices **20**-**1** to **20**-N, while being built into each content reproduction device represented by a TV receiver, is disposed in a general house, or the like. Hereinafter, when there is no need to distinguish individual terminal devices **20**-**1** to **20**-N, they are simply referred to as the terminal device **20**.

[Description of Terminal Device **20**]

The terminal device **20** is connected to the supply device **30** through a broadcast network **11** such as the TV broadcast network, the CATV network, and the IPTV network, and the Internet **12**.

The terminal device **20** includes a content renderer **21**, an ACR client **22**, an application manager **23**, and a user interface **24**.

The content renderer **21** has a function to acquire content from outside so as to be reproduced. Further, the content renderer **21** transfers all content displayed on a display such as a TV receiver having a built-in terminal device **20** so as to be supplied to the ACR client **22**. In other words, not only a program received in a tuner of the TV receiver having a built-in terminal device **20**, but also content which is input through various types of input terminals (such as a HDMI terminal) of the TV receiver are transferred and supplied to the ACR client **22**.

The ACR client **22** extracts signature data representing the characteristics of the content from content which is input by the content renderer **21**, in a predetermined sampling period. Here, a method of extracting the signature data is arbitrary. For example, a watermark which has been embedded in advance in the content may be extracted and taken as signature data, or a fingerprint may be calculated and taken as signature data.

Even if a resolution of content, an aspect ratio, a bit rate, and an encoding format are converted, it is possible to obtain the same signature data before and after conversion by using the fingerprint as the signature data. Accordingly, identification accuracy at the time of the identification of the content based on the signature data can be increased.

Further, the ACR client **22** generates an ACR query including the extracted signature data, and transmits the generated ACR query to an ACR server **31** of the supply device **30** through the Internet **12**. Further, the ACR client **22** receives and holds an ACR response which is returned by the ACR server **31** in response to the ACR query from the ACR client **22**. Further, the ACR client **22** analyzes the held ACR response and causes the application manager **23** to execute an application corresponding to the content being viewed.

The application manager **23** acquires an application corresponding to the content being viewed from an application server **33** through the Internet **12** and executes the application, in response to a control from the ACR client **22**. Further, the application manager **23** has an associated metadata acquisition Application Program Interface (API) and acquires associated metadata corresponding to the application being executed from the ACR client **22**, using the associated metadata acquisition API.

The user interface **24** causes various types of information displayed by the application being executed to be displayed on the display. Further, the user interface **24** receives an operation of the user for the application being executed.

[Description of Supply Device **30**]

The supply device **30** includes the ACR server **31**, a content server **32**, and the application server **33**.

The ACR server **31** generates and holds in advance ACR reference data in which the signature data extracted from each of various pieces of content capable of being viewed on the terminal device **20** in a predetermined sampling period is associated with an application identifier, associated metadata, or the like. The ACR server **31** generates an ACR response in response to the ACR query transmitted from the ACR client **22** of the terminal device **20** and returns the ACR response to the ACR client **22** through the Internet **12**.

The content server **32** distributes content through the broadcast network **11** and supplies the ACR server **31** with the distributed content and the associated metadata.

In addition, the ACR server **31**, the content server **32**, and the application server **33** constituting the supply device **30** may be disposed while being concentrated at one location, or may be disposed in a dispersed manner. Further, the ACR server **31**, the content server **32**, and the application server **33** may be combined appropriately to configure the supply device **30**.

[Detailed Configuration Example of ACR Client **22**]

FIG. **2** shows a detailed configuration example of the ACR client **22** constituting the terminal device **20**.

The ACR client **22** includes a signature extraction unit **41**, an ACR query generation unit **42**, a communication unit **43**, a holding unit **44**, and an ACR response analysis unit **45**.

As shown in FIG. **3**, the signature extraction unit **41** extracts signature data representing the characteristics from the content which is input from the content renderer **21**, according to a predetermined extraction method in a predetermined sampling period and outputs the extracted signature data to the ACR query generation unit **42**. In addition, the extraction period and the sampling period of the signature data may be set arbitrarily by the user.

Whenever signature data is input from the signature extraction unit **41**, the ACR query generation unit **42** generates an ACR query including the signature data. The data structure of the ACR query will be described with reference to FIG. **5**.

The communication unit **43** transmits the ACR query generated by the ACR query generation unit **42** to the ACR server **31** of the supply device **30** through the Internet **12**. Further, the communication unit **43** receives the ACR response returned from the ACR server **31** and outputs the received ACR response to the holding unit **44**.

The holding unit **44** holds the ACR response received by the communication unit **43**, and supplies the associated metadata included in the ACR response, in response to a request from the associated metadata acquisition API of the application manager **23**. In addition, when the ACR response including the associated metadata requested from the associated metadata acquisition API is not held in the holding unit **44**, the ACR query may be generated again and transmitted to the ACR server **31** such that the ACR response including the requested associated metadata may be acquired.

The ACR response analysis unit **45** analyzes the ACR response which is returned from the ACR server **31** and is held in the holding unit **44**, specifies an application to be

executed in conjunction with the content being viewed, and notifies the application manager **23** of the specified application.

[Detailed Configuration Example of ACR Server **31**]

FIG. **4** shows a detailed configuration example of the ACR server **31** constituting the supply device **30**.

The ACR server **31** includes a content acquisition unit **51**, a signature extraction unit **52**, an ACR database **53**, a communication unit **54**, and an ACR response generation unit **55**.

The content acquisition unit **51** acquires various types of content which can be viewed on the terminal device **20** and the associated metadata from the content server **32**, or the like, and supplies the signature extraction unit **52** and the ACR database **53** with the acquired content and the acquired associated metadata, respectively.

As shown in FIG. **3**, the signature extraction unit **52** extracts signature data representing the characteristics from the content which is input from the content acquisition unit **51**, according to a predetermined extraction method, in a predetermined sampling period and outputs the extracted signature data to the ACR database **53**.

The ACR database **53** generates ACR reference data by associating each piece of signature data from the signature extraction unit **52** with the content of an extraction source, an application to be linked, associated metadata used in the application, and the like, and holds the generated ACR reference data. In addition, the ACR reference data which is generated in advance may be supplied to and held in the ACR database **53**. The data structure of the ACR reference data will be described later with reference to FIG. **6**.

The communication unit **54** receives the ACR query transmitted from the ACR client **22** of the terminal device **20** through the Internet **12** and outputs the received ACR query to the ACR response generation unit **55**. Further, the communication unit **54** transmits the ACR response generated in the ACR response generation unit **55** to the ACR client **22** of the terminal device **20** through the Internet **12**.

The ACR response generation unit **55** identifies content corresponding to the signature data included in the ACR query transmitted from the ACR client **22** of the terminal device **20** by referring to the ACR reference data of the ACR database **53**. Further, the ACR response generation unit **55** generates an ACR response including a content identifier as an identification result, an application identifier representing an application to be executed in conjunction with the progress of the identified content, and associated metadata used by the application or the like so as to be output to the notification unit **54**.

In addition, when the ACR response generation unit **55** generates the ACR response, a communication delay of the ACR response in the Internet **12** is estimated based on an extracted local time stamp **75** (FIG. **5**) included in the ACR query, and associated metadata stored in the ACR response is selected in view of a processing time of the ACR response generation unit **55** itself. The data structure of the ACR response will be described with reference to FIG. **7**.

[Data Structure of ACR Query]

FIG. **5** shows the data structure of the ACR query generated in the ACR query generation unit **42** of the ACR client **22**.

The ACR query **70** includes an ACR query identifier **71**, an extraction method identifier **72**, a service identifier **73**, signature data **74**, an extracted local time stamp **75**, a source address **76**, and a signature **77**.

The ACR query identifier **71** is information for specifying the ACR query **70**. The extraction method identifier **72** is information for specifying an extraction method used at the time of extracting the signature data **74**. When there are a plurality of services which perform identification of the content based on the signature data **74**, the service identifier **73** is information for selecting a service for processing the ACR query **70**.

The signature data **74** is what is extracted from the content in the signature extraction unit **41**. The extracted local time stamp **75** is intended to represent a timing when the signature data **74** is extracted in the signature extraction unit **41**, and is represented by a time that a local system clock of the terminal device **20** indicates.

The source address **76** is information indicating a terminal device **20** sending the ACR query **70**, in other words, a return destination of the ACR response generated by the ACR server **31** in response to the ACR query **70**. The signature **77** is intended to prevent the ACR query **70** from being falsified in a communication path. In addition, the falsification may be prevented by encrypting and transmitting the entire ACR query **70**.

[Data Structure of ACR Reference Data]

FIG. **6** shows a data structure of ACR reference data which is held in the ACR database **53** of the ACR server **31**.

A content identifier **82**, a reproduction time **83**, an application identifier **84**, and associated metadata **85** are recorded in association with the signature data **81** in the ACR reference data **80**.

The signature data **81** is what is extracted from the content in the signature extraction unit **52**. The content identifier **82** is information representing content of the extraction source of the signature data **81**. The reproduction time **83** is intended to represent a progress timing of content when the signature data **81** is extracted from content represented by the content identifier **82**, and for example, is represented by an elapse time from the beginning of content represented by the content identifier **82**.

The application identifier **84** is information indicating an application to be executed in conjunction with the progress timing indicated by a reproduction time **83** of content indicated by the content identifier **82**. The associated metadata **85** includes various types of information (such as data to be displayed) used in the application indicated by the application identifier **84**.

[Data Structure of the ACR Response]

FIG. **7** shows a data structure of an ACR response generated in the ACR response generation unit **55** of the ACR server **31**. In addition, A in FIG. **7** shows an ACR response when content corresponding to the signature data **74** of the ACR query **70** transmitted from the ACR client **22**, in other words, content being viewed in the terminal device **20** is identified, by referring to the ACR reference data **80** in the ACR database **53**. B in FIG. **7** shows an ACR response when content is not identified.

The ACR response **90** when the content being viewed in the terminal device **20** is identified (A in FIG. **7**) includes an ACR query identifier **91**, an extraction method identifier **92**, a service identifier **93**, an extracted local time stamp **94**, a content identifier **95**, a reproduction time **96**, an application identifier **97**, associated metadata **98**, a source address **99**, and a signature **100**.

The ACR response **90** when the content being viewed in the terminal device **20** is not identified (B in FIG. **7**) includes an ACR query identifier **91**, a service identifier **93**, a source address **99**, a signature **100**, and an identification failure flag **101**.

The ACR query identifier **91** to the extracted local time stamp **94** are what specify an ACR query **70** which is a

trigger to generate the ACR response **90**, and the ACR query identifier **71** to the service identifier **73** of the ACR query **70**, and the extracted local time stamp **75** are diverted therefor.

The content identifier **95** is information indicating the identified content, and the content identifier **82** of the ACR reference data **80** is diverted therefor. The reproduction time **96** is information indicating a progress timing of the identified content, and the reproduction time **83** of the ACR reference data **80** is diverted therefor.

The application identifier **97** is information specifying an application to be executed according to the progress timing indicated by the reproduction time **96** of the identified content, and the application identifier **84** of the ACR reference data **80** is diverted therefor. In addition, the application identifier **97** includes information indicating an acquisition destination (application server **33**) of the application.

The associated metadata **98** includes various types of information (such as data to be displayed) used according to the progress timing indicated by the reproduction time **96** in an application indicated by the application identifier **97**, and the associated metadata **85** of the ACR reference data **80** is diverted therefor. In addition, the application identifier **97** and the associated metadata **98** are changed during a period from the beginning to the end of the content, thereby allowing the content to be activated in conjunction with the progress of the content to be changed or information to be displayed to be switched.

The source address **99** is information indicating the ACR server **31** transmitting the ACR response **90**. The signature **100** is intended to prevent the ACR response **90** from being falsified in a communication path. In addition, the falsification may be prevented by encrypting and transmitting the entire ACR response **90**.

The identification failure flag **101** is intended to indicate that the content corresponding to the signature data **74** of the ACR query **70** cannot be identified as a result of referring to the ACR reference data **80**.

[Operation by Linked Application Supplying System **10**]

FIG. **8** is a flowchart describing an operation by the linked application supplying system **10** shown in FIG. **1**.

In addition, as a premise of the operation description, it is assumed that ACR reference data **80** which has been generated in advance is held in the ACR database **53** of the ACR server **31** constituting the supply device **30**.

If content is reproduced by a TV receiver built into the terminal device **20**, in other words, the user views the content by the TV receiver, in step S**1**, the content renderer **21** of the terminal device **20** transfers the content being viewed to be output to the ACR client **22**. In the ACR client **22**, the signature extraction unit **41** extracts signature data from the content being viewed in a predetermined sampling period and outputs the extracted signature data to the ACR query generation unit **42**.

In step S**2**, the ACR query generation unit **42** generates an ACR query **70** including the signature data which is input from the signature extraction unit **41** and outputs the generated ACR query **70** to the communication unit **43**. The communication unit **43** transmits the generated ACR query **70** to the ACR server **31** of the supply device **30** through the Internet **12**.

On the other hand, in step S**11**, the ACR server **31** of the supply device **30** is on standby until the communication unit **54** receives the ACR query **70** transmitted from the ACR client **22** of the terminal device **20**. If the ACR query **70** is received by the communication unit **54**, the process proceeds to step S**12**.

In step S**12**, the ACR response generation unit **55** identifies the content corresponding to the signature data **74** included in the received ACR query **70**, by referring to the ACR reference data **80** of the ACR database **53**.

In step S**13**, the ACR response generation unit **55** generates an ACR response **90** in response to an identification result of the content. In other words, when the content corresponding to the signature data **74** included in the ACR query **70** is identified, the ACR response **90** shown by A in FIG. **7** is generated, but when the content is not identified, the ACR response **90** shown by B in FIG. **7** is generated. The communication unit **54** transmits the generated ACR response **90** to the ACR client **22** of the terminal device **20** through the Internet **12**.

If the ACR response **90** is received and held by the ACR client **22**, in step S**3**, the ACR response analysis unit **45** analyzes the held ACR response **90** to specify the application to be executed in association with the progress of the content being viewed, and notifies the application manager **23** of the application identifier **97** and the content identifier **95**. According to the notification, the application manager **23** acquires the application represented by the application identifier **97** from the application server **33** through the Internet **12** and executes the acquired application.

Further, the application manager **23** gives the content identifier **95** and the application identifier **97** as arguments to any associated metadata acquisition API so as to acquire the associated metadata **98** corresponding to the executed application from the ACR client **22**.

At this time, the associated metadata acquisition API notifies the application manager **23** of the local time stamp at the time of acquiring the associated metadata **98** from the ACR client **22** as well as the extracted local time stamp **94** which is acquired from the ACR response **90** held in the ACR client **22**. The application manager **23** and the application executed by the application manager **23** can process the associated metadata in view of a time difference between the two local time stamps.

The afore-mentioned operations are repeatedly performed while the content is viewed. Thus, this allows the operations of the application in conjunction with the progress of the content being viewed to be performed.

Then, for example, it is possible to display information related to the content, to realize a quiz or a vote of a viewer-participating type, and to recommend or download other pieces of content, depending on the type of the application to be linked.

However, in the case of the linked application supplying system **10** shown in FIG. **1**, if a large number of terminal devices **20** access the ACR server **31** and transmit ACR queries at the same time through the Internet **12**, a heavy load is applied to the ACR server **31**. As a result, it takes a long time from when the terminal devices **20** transmit the ACR queries until the terminal devices **20** receive the ACR responses, and thus a time until the application is executed in conjunction with the progress of the content increases. Accordingly, a mechanism for dispersing the processing load of the ACR server **31** is needed.

Therefore, a second configuration example of the linked application supplying system which is configured to disperse the processing load of the ACR server **31** will be described.

[2. Second Configuration Example of Linked Application Supplying System]

FIG. **9** shows the second configuration example of the linked application supplying system which is the embodiment of the present disclosure.

The linked application supplying system **110** is intended to execute an application in conjunction with progress of content being viewed by a user in a TV receiver or the like, similar to the linked application supplying system **10** of FIG. **1**.

In addition, among components of the linked application supplying system **110**, the components common to the linked application supplying system **10** are denoted by the same reference numerals, and thus the description thereof will not be repeated.

The linked application supplying system **110** includes a plurality of terminal devices **20-1** to **20-K**, a supply device **30**, and a high-performance terminal device **120**.

Similarly to the terminal device **20**, the high-performance terminal device **120**, while being built into a content reproduction device represented by a TV receiver, is disposed in a general house or the like.

The high-performance terminal device **120** and one or more terminal devices **20** form an ad hoc network **125** through a LAN or the Internet **12** in a wired or wireless manner. In addition, the ad hoc network **125** may include a plurality of high-performance terminal devices **120**. Further, instead of the ad hoc network **125**, the high-performance terminal device **120** and the terminal device **20** may form a P2P network.

In addition, it is assumed that the terminal device **20** constituting the ad hoc network **125** first transmits the generated ACR query **70** to the high-performance terminal device **120**, and when the ACR response **90** is not returned from the high-performance terminal device **120**, the terminal device **20** transmits the previous ACR query **70** to the ACR server **31**.

Further, it is assumed that the ACR server **31** of the supply device **30** not only holds the generated ACR reference data **80** in the ACR database **53** built into itself, but also supplies the generated ACR reference data **80** to the content server **32** so as to be broadcasted through the broadcast network **11**.

[Description of High-Performance Terminal Device **120**]

The high-performance terminal device **120** is connected to the supply device **30** through the broadcast network **11** such as a TV broadcast network, a CATV network, an IPTV network and the Internet **12**.

The high-performance terminal device **120** includes a content renderer **21**, a high-performance ACR client **122**, an application manager **23**, and a user interface **24**. In other words, in the high-performance terminal device **120**, the ACR client **22** of the terminal device **20** is replaced with the high-performance ACR client **122**.

The high-performance ACR client **122** operates similarly to the ACR server **31** in the ad hoc network **125**, in addition to having the same operation as the ACR client **22**.

[Detailed Configuration Example of High-Performance ACR Client **122**]

FIG. **10** shows a detailed configuration example of the high-performance ACR client **122** constituting the high-performance terminal device **120**.

The high-performance ACR client **122** includes a signature extraction unit **41**, an ACR query generation unit **42**, a holding unit **44**, an ACR response analysis unit **45**, a communication unit **131**, an ACR database (DB) cache **132**, and an ACR response generation unit **133**.

In other words, in the high-performance ACR client **122**, the communication unit **131** is provided instead of the communication unit **43** of the ACR client **22** shown in the detailed configuration example of FIG. **2**, and the ACR database cache **132** and the ACR response generation unit **133** are added.

Similarly to the communication unit **43** in FIG. **2**, the communication unit **131** transmits the ACR query **70** generated by the ACR query generation unit **42** to the ACR server **31** of the supply device **30** through the Internet **12**. Further, the communication unit **43** receives the ACR response **90** returned from the ACR server **31** and outputs the received ACR response **90** to the holding unit **44**.

Further, the communication unit **131** receives the ACR query **70** transmitted from the terminal device **20** within the ad hoc network **125** and outputs the received ACR query **70** to the ACR response generation unit **133**, and returns the ACR response **90** generated in the ACR response generation unit **133** to the corresponding terminal device **20**.

The ACR database cache **132** acquires and holds the ACR reference data **80** which is generated in the ACR server **31** of the supply device **30** and transmitted through the broadcast network **11**. However, due to the capacity of the ACR DB cache **132**, the transmission timing of the ACR reference data **80** and the like, all pieces of ACR reference data **80** which have been held in the ACR database **53** of the ACR server **31** are not necessarily held in ACR database cache **132**.

In addition, the high-performance ACR client **120** may acquire the ACR reference data **80** generated in the ACR server **31** of the supply device **30** from the ACR server **31** through the Internet **12**.

Similarly to the ACR response generation unit **55** of the ACR server **31**, the ACR response generation unit **133** identifies content corresponding to the signature data **74** included in the ACR query **70** transmitted from the terminal device **20** within the ad hoc network **125** by referring to the ACR reference data **80** of the ACR database cache **132**. Further, even for the ACR query **70** generated by the ACR query generation unit **42** together with the ACR response generation unit **133** constituting the high-performance ACR client **122**, the ACR response generation unit **133** can identify content corresponding to signature data **74** included therein.

Then, when the content is identified, the ACR response generation unit **133** generates the ACR response **90** including the content identifier **95**, and the application identifier **97** as an identification result, and outputs the ACR response **90** to the notification unit **131**. When the content is not identified, the ACR response generation unit **133** does not generate the ACR response **90**. However, even when the content is not identified, the ACR response **90** indicating that the content is not identified (B in FIG. **7**) may be generated.

[Operation of Linked Application Supplying System **110**]

FIG. **11** is a flowchart describing the operation by the linked application supplying system **110** shown in FIG. **9**.

In addition, as the premise of the operation description, it is assumed that the ACR reference data **80** which has been already generated is held in the ACR database **53** of the ACR server **31** constituting the supply device **30**. Further, it is assumed that the ACR reference data **80** which is generated in the ACR server **31** and transmitted through the broadcast network **11** from the content server **32** is held in the ACR database cache **132** of the high-performance terminal device **120**.

If content is reproduced by the TV receiver including the built-in terminal device **20**, in other words, the user views the content by the TV receiver, in step S**101**, the content renderer **21** of the terminal device **20** transfers the content being viewed to be output to the ACR client **22**. In the ACR client **22**, the signature extraction unit **41** extracts signature data from the content being viewed in a predetermined

sampling period and outputs the extracted signature data to the ACR query generation unit **42**.

In step **S102**, the ACR query generation unit **42** generates an ACR query **70** including the signature data which is input from the signature extraction unit **41** and outputs the generated ACR query **70** to the communication unit **43**. The communication unit **43** transmits the generated ACR query **70** to the high-performance terminal device **120** within the ad hoc network **125**.

On the other hand, in step **S111**, the high-performance ACR client **122** of the high-performance terminal device **120** is on standby until the communication unit **131** receives the ACR query **70** transmitted from the ACR client **22** of the terminal device **20** within the ad hoc network **125**. If the ACR query **70** is received by the communication unit **131**, the process proceeds to step **S112**.

In step **S112**, the ACR response generation unit **133** of the high-performance ACR client **122** identifies the content corresponding to the signature data **74** included in the received ACR query **70**, by referring to the ACR reference data **80** of the ACR database cache **132**.

In step **S113**, the ACR response generation unit **133** generates the ACR response **90** in response to an identification result of the content. In other words, only when the content corresponding to the signature data **74** included in the ACR query **70** is identified, the ACR response **90** shown by A in FIG. **7** is generated. The communication unit **131** transmits the generated ACR response **90** to the ACR client **22** of the corresponding terminal device **20** within the ad hoc network **125**. In addition, when the content is not identified, the ACR response **90** is not generated in the ACR response generation unit **133**.

In step **S103**, the terminal device **20** which has transmitted the ACR query **70** to the high-performance terminal device **120** is on standby for a predetermined time until it receives the ACR response **90** from the high-performance ACR client **122** of the high-performance terminal device **120**. When the ACR response **90** is received during the predetermined standby time, the process proceeds to step **S105** and the process based on the ACR response **90** (the same as the afore-mentioned process of step **S3** in FIG. **8**) is performed by the ACR client **22** of the terminal device **20**.

On the contrary, in step **S103**, when the ACR response **90** is not received during the predetermined standby time, the process proceeds to step **S104**.

In step **S104**, the communication unit **43** of the terminal device **20** transmits the ACR query **70** generated in step **S101** to the ACR server **31** of the supply device **30** through the Internet **12**. In addition, at this time, the ACR query **70** may be generated and transmitted again.

On the other hand, in step **S121**, the ACR server **31** of the supply device **30** is on standby until the communication unit **54** receives the ACR query **70** transmitted from the ACR client **22** of the terminal device **20**. If the ACR query **70** is received by the communication unit **54**, the process proceeds to step **S122**.

In step **S122**, the ACR response generation unit **55** identifies the content corresponding to the signature data **74** included in the received ACR query **70**, by referring to ACR reference data **80** of the ACR database **53**.

In step **S123**, the ACR response generation unit **55** generates the ACR response **90** in response to an identification result of the content. In other words, when the content corresponding to the signature data **74** included in the ACR query **70** is identified, the ACR response **90** shown by A in FIG. **7** is generated, but when the content is not identified, the ACR response **90** shown by B in FIG. **7** is generated. The communication unit **54** transmits the generated ACR response **90** to the ACR client **22** of the terminal device **20** through the Internet **12**.

If the ACR response **90** is received and held by the ACR client **22**, the process of step **S105** is performed. In other words, the ACR response analysis unit **45** analyzes the held ACR response **90** to specify the application to be executed in association with the progress of the content being viewed, and notifies the application manager **23** of the application identifier **97** and the content identifier **95**. According to the notification, the application manager **23** acquires the application represented by the application identifier **97** from the application server **33** through the Internet **12** and executes the application.

Further, the application manager **23** gives the content identifier **95** and the application identifier **97** as arguments to any associated metadata acquisition API to acquire associated metadata **98** corresponding to the executed application from the ACR client **22**.

The operations described above are repeatedly performed while the content is viewed. Thus, this allows the processing load of the ACR server **31** to be dispersed to the high-performance terminal device **120**.

However, the terminal device **20**, the supply device **30**, and the high-performance terminal device **120**, which perform the series of processes described above, can be realized by a computer executing software, as well as being respectively configured by hardware. The computer includes a computer that is built into dedicated hardware, or for example, a general-purpose personal computer capable of executing various functions by installing various types of programs.

FIG. **12** is a block diagram showing a configuration example of hardware of the computer described above.

In the computer **200**, a Central Processing Unit (CPU) **201**, a Read Only Memory (ROM) **202**, and a Random Access Memory (RAM) **203** are connected with each other through a bus **204**.

Further, an input and output interface **205** is connected to the bus **204**. An input unit **206**, an output unit **207**, a storage unit **208**, a communication unit **209**, and a drive **210** are connected to the input and output interface **205**.

The input unit **206** includes a keyboard, a mouse, a microphone, and the like. The output unit **207** includes a display, a speaker, and the like. The storage unit **208** includes a hard disk drive, a non-volatile memory, and the like. The communication unit **209** includes a network interface, and the like. The drive **210** drives a removable media **211** such as a magnetic disk, an optical disk, a magneto-optical disk, or a semiconductor memory.

The computer **200** configured as described above executes the series of processes described above by the CPU **201** loading the program stored, for example, in the storage unit **208** on the RAM **203** through the input and output interface **205** and the bus **204**, and executing the loaded program.

The program the computer **200** (CPU **201**) executes may be provided while being recorded on a removable media **211** as, for example, a package media, or the like. Further, the program may be provided through a wired or wireless transmission medium such as a local area network, the Internet, and a digital satellite broadcast.

In the computer **200**, a program may be installed in the storage unit **208** through the input and output interface **205** by mounting the removable media **211** in the drive **210**. Further, the program may be received by the communication unit **209** through a wired or wireless transmission medium,

and installed in the storage unit **208**. Alternatively, the program may be installed in advance in the ROM **202** and the storage unit **208**.

In addition, the program that the computer **200** executes may be a program in which processes are performed in a time series in the order described in this specification, or programs which are executed in parallel or at a necessary timing such as the time when calling is performed.

In addition, embodiments of the present disclosure are not limited to the embodiments described above, but various modifications are possible without departing from the scope of the present disclosure.

REFERENCE SIGNS LIST

10 LINKED APPLICATION SUPPLYING SYSTEM
20 TERMINAL DEVICE
21 CONTENT RENDERER
22 ACR CLIENT
23 APPLICATION MANAGER
24 USER INTERFACE
30 SUPPLY DEVICE
31 ACR SERVER
32 CONTENT SERVER
33 APPLICATION SERVER
41 SIGNATURE EXTRACTION UNIT
42 ACR QUERY GENERATION UNIT
43 COMMUNICATION UNIT
44 HOLDING UNIT
45 ACR RESPONSE ANALYSIS UNIT
51 CONTENT ACQUISITION UNIT
52 SIGNATURE EXTRACTION UNIT
53 ACR DATABASE
54 COMMUNICATION UNIT
55 ACR RESPONSE GENERATION UNIT
70 ACR QUERY
80 ACR REFERENCE DATA
90 ACR RESPONSE
110 LINKED APPLICATION SUPPLYING SYSTEM
120 HIGH-PERFORMANCE TERMINAL DEVICE
122 HIGH-PERFORMANCE ACR CLIENT
131 COMMUNICATION UNIT
132 ACR DATABASE CACHE
133 ACR RESPONSE GENERATION UNIT
200 COMPUTER
201 CPU

The invention claimed is:

1. A terminal device connectable to a content reproduction device, said terminal device comprising:

a memory having a program stored therein;

a central processing unit (CPU) configured to, during operation, execute the program stored in the memory, in which upon execution of the program, the CPU causes

(i) signature data representing characteristics of content being reproduced to be extracted from the content being reproduced,

(ii) a first query including at least the extracted signature data to be generated,

(iii) the generated first query to be transmitted for receipt by a server device,

(iv) an application, corresponding to an application identifier included in a received first response which is returned by the server device in response to the first query, to be acquired and executed,

(v) reference data, in which signature data that is held in a database of the server device and represents characteristics of content extracted from the content is associated with a content identifier representing the content of an extraction source and an application identifier representing an application to be executed in conjunction with the content, to be acquired and held, and

(vi) content to be identified of an extraction source of signature data included in a second query in response to the second query transmitted from a separate terminal device belonging to a common network, by referring to the reference data, and to generate a second response to be returned to the separate terminal device, including at least the application identifier representing an application to be executed in conjunction with the identified content.

2. The terminal device according to claim **1**, in which upon execution of the program, the CPU further causes

content to be identified of an extraction source of signature data included in the first query, by referring to the reference data, and to generate a third response including at least the application identifier representing an application to be executed in conjunction with the identified application, and

an application corresponding to an application identifier included in the generated third response to be acquired and executed.

3. The terminal device according to claim **2**,

wherein the generated first query includes at least the extracted signature data and an extraction time stamp representing a timing when the signature data is extracted, and

wherein the executed application acquires associated metadata which is selected by the server device based on the extraction time stamp which is included in the received second response, and performs a predetermined process.

4. The terminal device according to claim **2**,

wherein the terminal device is built into the reproduction device which reproduces content, and

wherein upon execution of the program, the CPU further causes all pieces of content which are reproduced by the reproduction device to be supplied to the terminal device.

5. An information processing method for use with a terminal device having a central processing unit (CPU), said terminal device connectable to a content reproduction device, said method comprising:

causing, by use of the CPU,

(i) signature data representing characteristics of content being reproduced to be extracted from the content being reproduced,

(ii) a first query including at least the extracted signature data to be generated,

(iii) the generated first query to be transmitted for receipt by a server device,

(iv) an application, corresponding to an application identifier included in a received first response which is returned by the server device in response to the first query, to be acquired and executed,

(v) reference data, in which signature data that is held in a database of the server device and represents characteristics of content extracted from the content is associated with a content identifier representing the content of an extraction source and an application identifier representing an application to be executed in conjunction with the content, to be acquired and held, and

(vi) content to be identified of an extraction source of signature data included in a second query in response to the second query transmitted from a separate terminal

device belonging to a common network, by referring to the reference data, and to generate a second response to be returned to the separate terminal device, including at least the application identifier representing an application to be executed in conjunction with the identified content.

6. A non-transitory computer readable medium having stored thereon a program to cause a computer of a terminal device connectable to a content reproduction device to perform a method, said method comprising:

causing signature data representing characteristics of content being reproduced to be extracted from the content being reproduced;

causing a first query including at least the extracted signature data to be generated;

causing the generated first query to be transmitted for receipt by a server device;

causing an application, corresponding to an application identifier included in a received first response which is returned by the server device in response to the first query, to be acquired and executed;

causing reference data, in which signature data that is held in a database of the server device and represents characteristics of content extracted from the content is associated with a content identifier representing the content of an extraction source and an application identifier representing an application to be executed in conjunction with the content, to be acquired and held; and

causing content to be identified of an extraction source of signature data included in a second query in response to the second query transmitted from a separate terminal device belonging to a common network, by referring to the reference data, and to generate a second response to be returned to the separate terminal device, including at least the application identifier representing an application to be executed in conjunction with the identified content.

7. A linked application supplying system comprising a terminal device and a server device,

wherein the terminal device includes:

a memory having a program stored therein;

a central processing unit (CPU) configured to, during operation, execute the program stored in the memory, in which upon execution of the program, the CPU causes

(i) signature data representing characteristics of content being reproduced to be extracted from the content being reproduced,

(ii) a first query including at least the extracted signature data to be generated,

(iii) the generated first query to be transmitted for receipt by the server device,

(iv) an application, corresponding to an application identifier included in a received first response which is returned by the server device in response to the first query, to be acquired and executed,

(v) reference data, in which signature data that is held in a database of the server device and represents characteristics of content extracted from the content is associated with a content identifier representing the content of an extraction source and an application identifier representing an application to be executed in conjunction with the content, to be acquired and held, and

(vi) content to be identified of an extraction source of signature data included in a second query in response to the second query transmitted from a separate terminal device belonging to a common network, by referring to the reference data, and to generate a second response to be returned to the separate terminal device, including at least the application identifier representing an application to be executed in conjunction with the identified content;

wherein the server device includes:

a second memory to hold the reference data;

a second CPU configured to, during operation, cause content to be identified of an extraction source of signature data included in the first query transmitted from the terminal device, by referring to the reference data, and to generate the first response including at least the application identifier representing an application to be executed in conjunction with the identified content; and

a communication interface to transmit the generated first response to the terminal device and to supply the reference data held in the second memory to the terminal device through a predetermined network.

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